

A N
EXPERIMENTAL AND PRAGTICAL
E N Q U I R Y
I N T O T H E
Ophthalmic, Antiscrophulous, and Nervous
P R O P E R T I E S
O F T H E
Mineral Water of LLANGYBI,
I N
CARNARVONSHIRE.

To which is annexed,
An ESSAY on the PRIZE QUESTION,
Proposed by the
ROYAL ACADEMY OF BOURDEAUX,
For the Year 1767,
On the Subject of
ANALIZING MINERAL WATERS.

By DIEDERICK WESSEL LINDEN, M. D.

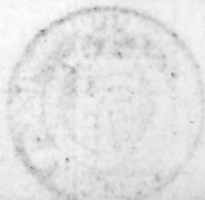
Ὀδύνας ὀφθαλμῶν ἀκρησποση, ἢ λυτρὸν, ἢ πυρίη, ἢ φλεβο-
τομία, ἢ φαρμακείη λύει. Hippocrates.

Oculorum dolores meri potus, aut balneum, aut fomen-
tum, aut venesection, aut purgatio solvit,

L O N D O N :

Printed by J. EVERINGHAM ; and Sold by C. MORAN,
under the Piazza, Covent-garden ; W. WILLIAMS,
Bookseller, in Shrewsbury ; J. BULKELEY, Book-
seller, in Chester ; P. TITLEY, Apothecary, in Llan-
rwst ; H. JONES, Mercer, in Carnarvon ; and R.
GRIFFITH, Mercer, in Pwllhely, 1767.

[Price Two Shillings.]



EXPERIMENTAL AND PRACTICAL
 ENQUIRY
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 On the subject of
 ANALYSING MINERAL WATERS.

By DEDRICK WESTER LINDER, M.D.
 Oculorum dolores, etiam horum, et dolentium, et tumen-
 tum, et videretur, et puerisio foris.

L O N D O N:
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 under the Piazza, Covent-garden; W. WILLIAMS,
 Bookseller, in Shewsbury; J. BAKER, Book-
 seller, in Chester; P. TITNEY, Apothecary, in Lan-
 castre; H. JONES, Merchant, in Llangynidr; and R.
 GRISTON, Minister, in Llangynidr, 1767.
 [Price Two Shillings]



WILLIAM PRICE, Esq;

OF

RHIWLAS IN MERIONETHSHIRE,

Fellow of the ROYAL and ANTIQUARIAN Societies.

S I R,

IT is with the greatest pleasure I inform the Public, that I have your permission to put this Treatise under the same Patronage with the Waters, whose Virtues it records. You have an undoubted right both to the Spring, and the Register of its Merit: To the former, not only by the natural Title of Proprietor, but also from the Conveniencies and Improvements bestowed on it by a liberal Benefaction; to the latter, by inviting the Author to make Experiments on its salutary Qualities, and also to permit him to communicate those Experiments to the World.

And hereby we may venture to say, you have erected a Monument to your



ii DEDICATION.

own Memory, which neither Time will deface, nor Accident destroy. In the most distant Ages, when many Fellow-creatures, afflicted with various Disorders, shall receive their Cures at this Spring; when the Lepers shall be cleansed, the Blind see, and the Lame walk, they will with Gratitude revere the name of that Instrument of Providence, who rendered the Mineral Water of Llangybi of universal Benefit.

I am, SIR,

With the greatest Respect,

Your most obedient Servant,

April 20, 1767.
Llangybi,

D. W. LINDEN.



T H E
P R E F A C E.

ROCKS and Mountains are the places where we must look for Mineral Waters, because they are the Repositories, whence these Waters receive their Properties and Virtues. In the mountainous County of Carnarvon, Mining is only in its infancy ; but from what has been done within these few years it is evident, that its stupendous Alps are not without several metallic Ores, and many other Minerals ; and therefore it is by no means surprizing, to meet with an excellent Mineral-water at Llangybi, in the neighbourhood, and at the foot of those Mountains.

THIS Water is a new species ; such a one I mean as never has been heard of in Medical History : but its Virtues have been long

known by Experience, it has been used as a Medicine for many Centuries; and if the tradition be true, that it was recommended by St. Kebys, we may safely conclude, that it is the most ancient cold Mineral-water, that has been used for healing purposes in Great Britain. Therefore, tho' it differs so greatly from those that have been hitherto recommended to the world, yet as I am convinced, that many extraordinary Cures have been performed by it; (some of which were under my own inspection) and as its salutary Contents yield to an experimental Discovery, I think it my Duty to comply with the Request of the Worthy and Reverend Promoter, and several Gentlemen of the Faculty, and without farther delay, to communicate my Experiments to the Public.

AND here it may not be improper to observe, that in this Treatise I follow no Medical Sect, nor adhere to any particular Physical System. Being an enemy to vague conjecture and mere hypothesis, I submit myself intirely to the strict and unalterable rules of the immortal HIPPOCRATES, and in consequence thereof draw all my conclusions,
from

from the Experience of the Cures performed by this Water, adding only such Chemical Experiments, and Corollaries, deducible from them, as are intelligible to common capacities.

To what is said in the Treatise concerning Metallic or Mineral Preparations which are used as Medicines, I beg leave to add, that several of them which are the most active in operation are of a white colour, are then nearest to their natural origin, and extremely salutary and beneficial to the human Constitution, in the most obstinate Chronical Distempers. But as soon as there comes any adventitious or designed mixture to them, so as to change from white to any other colour, they then become deadly Poisons, instead of wholesome Medicines; whence it is obvious to observe, that the Chemical Operations in preparing these Medicines cannot be too carefully performed: and when we consider what powerful effects are produced by them in small quantities, we shall not be surprized at the excellent Virtues of the medical Agent in the Water we are recommending. For as the Preparations of Nature

ture surpass those of Art, tho' ever so carefully attended to, the judicious Reader will agree with me, in giving the Preference to the White Earth in the Water of Llangybi.

WHEN I was engaged in investigating its Properties and Virtues, I imagined I should be the only one that informed the Public of a new kind of Mineral-water; but herein I find myself mistaken, for the St. James's Chronicle, No. 955, tells of a discovery of this sort, which was lately made at Ronneburg, in the dominions of the Duke of Saxe Gotha, and justly celebrates the Beneficence of this excellent Prince, who is making conveniencies in that mountainous country for the Diseased Visitors of its salubrious Spring. And if an attention to a Charity of this sort be deservedly judged to add fresh lustre to the glories of a Crown, and even Honour to the Character of a Sovereign, who was always distinguished for his great Humanity, and the benevolence of his Disposition; surely it will not be thought less Merit in a private Gentleman, who is doing the same good Works, on the same
good

good Principles, in the Mountains of Carnarvonshire.

THE Essay on the best Method of Analyzing Mineral Waters, &c. &c. was written, in consequence of seeing in the Gazette de la Hay 22 September, and in the London Chronicle, September 27, 1766, that the Royal Academy of Bourdeaux have proposed a Prize Question on that subject. But as the account in those Papers is very short, and no Method pointed out, whereby an Essay is to be transmitted or presented to the Academy; and as I am in this remote Country, inconveniently situated for a foreign Correspondence, I have annexed it to this Treatise, not knowing a more eligible Method of communicating an Answer to the learned Proposers of that useful Question. And as I doubt not, but by some Means or other they will see the Essay, so I am equally confident, that Men of their Character will dispense with the ceremonial Part, and if they find Merit in the Performance, will do the same Justice to it, as if it had been presented in a more regular manner.

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A
TREATISE
ON
LLANGYBI WATERS.

CHAP. I.

A short Geographical History of Llangybi
Medicinal Mineral WATERS.

 LANGYBI, a small village and parish in Carnarvonshire, is in that division or hundred, which in the antient British language is called *Afionydd*, which signifies in English a watry country, or a tract of ground that contains many rivers. On the south of this hundred are the great sands, which in the same antient language are called *Traethmawr*, thro' which Aberglaslyn river passes, which is the boundary between Carnarvonshire and Merionethshire; and at the

B

west



west of these sands this river mixes with the sea.

To the west, from the mineral fountain at Llangybi, is Cardigan Bay in full view; and the nearest part of this bay or sea is about two miles distant from this Medical Well; which is a most happy circumstance, to be thus situated near the sea; because sea-water, mixed with the Llangybi Mineral-water, has proved of the most salutary consequences to scrophulous patients.

In the hundred of Afonydd are eleven parishes; and I am apt to think, that Llangybi is the most antient amongst them all, because it was founded by St. Keby, son of Salamon duke of Cornwall, in or rather before the year 390. This St. Keby was a disciple of St. Hilary, bishop of Poitiers, in France, with whom he lived 50 years, and by him was made a bishop; on his return from France he went to St. David's, afterwards into Ireland, and at last fixed himself in Anglesea, where he founded several churches, in that and the neighbouring country of Carnarvon, of which Llangybi is one *.

THIS

Vid. Church Hist. of Britain, by Tho. Fuller.



THIS Llangybi Mineral-water, if we may credit tradition, has been in repute in the most early times ; and I am apt to think, that St. Keby was no stranger to the medical virtues it is endowed with ; because he planted his church so conveniently near the spring, that he might, at any proper opportunity, lay an ecclesiastical excise upon it, which in time actually happened to be the case ; but this is no more than what the reverend fathers, in former ages, have universally practised in all other places, wherever they happened to meet with medical waters.

THIS Mineral-water spring is at the foot of a round hill, which has a very easy ascent, from whence appear several most delightful prospects of all that part of the country, or hundred of Afonydd, which, as it is flat, and abounds with gentlemen's seats, villages and farms, affords a pleasing variety to every beholder. This mountain stands entirely unconnected with any other ; on the summit are the ruins of a camp, or rather of a castle for a garrison, of which no written history, or traditional account, remains ; but there is no manner of doubt, that

this place, in troublesome times, was a station for the defence of that part of the country, as being the most convenient spot for that purpose.

No minerals are yet discovered in this mountain, from whence our mineral spring issues; and as far as I can learn, there never have been any trials made for that purpose; nor could I find any remains of trenches or other works; but as the neighbouring southern hills of Penmorfen, the British Alps to the east, and those to the north towards Carnarvon, abound in Mundic and Marcasites, we may therefore, without doubt, expect the same mineral fertility in this, from whence our water proceeds.

THE stones on the surface of the earth about Llangybi spring are a bastard free-stone, of the hardest kind; they are not in regular beds, but in a confused manner scattered about; nor do they strike very deep into the ground; and immediately under them sets in a small bed of stone pretty regular, exceeding ponderous, which is a mixture of various kinds of stone, with several colours,

colours, such as blue, iron oker, and perforated holes filled up, with that white metallic earth, of which our Mineral-water partakes; this stone will smelt in a strong fire, without the assistance of salts.

FROM this mountain, we behold to the south, at the distance of three or four miles, Abereirch, which in English signifies the Coffin Harbour; and Pwllhely, (in English the Briny Pool) a corporation seaport, and trading town. At the south, five or six miles off, is Traethmawr, or the Great Sands, with the village of Penmorfen, and the remains of Cricieth Castle; to the east is a full view of Snowden, and all those high mountains, which all the world over are known by name of the British Alps; and the city of Carnarvon, the metropolis of the county, is at the north twelve miles distant, but cannot be seen from this hill, because a large ridge of mountains intercept the prospect of this most polite and hospitable city.

THE roads between Carnarvon and Llangybi are such, that coaches and wheel-carriages can travel them with safety, which as

yet, thro' Denbigh, Llanroost, Festiniog, and that part of Merionethshire to Penmorfen, is not possible; but as a spirit for making roads fit for wheel-carriages prevails in this country, it is to be wished and hoped, that this part may not be forgot, because there is so much variety of landscapes and prospects, as also of natural productions, animal, vegetable and mineral, in this circuit, that it is greatly to be regretted, it is not more visited by ingenious travellers, for want of a commodious road.

THE air at Llangybi is naturally healthy and mild, the piercing north and east winds, are broke and intercepted by large chains of mountains, so that it is all fanned over with sea breezes, which are most refreshing to those that are afflicted with disorders in the lungs, and salutary in most chronical diseases.

ALL the country round about Llangybi is very fruitful, and the late improvements have shewn, beyond contradiction, that these lands are capable of bearing all kinds of grain, with proper management, to as great perfection and

and abundancy, as the best lands in England are able to do; in short, it is a plentiful country, so that visitors to this Medical Water need not be afraid of being in want of delicate provisions; the only things wanted are good lodging-houses; but I hope to live to see that inconvenience removed, because I am in great expectation that some will shortly be built; however, such as have occasion for an immediate trial of this water for the benefit of their eyes, may make a shift with such houses as the village of Llangybi affords, bringing only a few bed-cloaths and bathing habits with them.

C H A P. II.

On the antient Use, and the Cause of the present Improvement of the Llangybi Water.

HOW long the Llangybi Mineral-waters have been used for relief in several maladies is impossible to determine; but thus much is certain, that in the days of popery, before the reformation, they were very much resorted to for these purposes; and there was a chest in the church (which

very lately remained there) in which the patients were obliged to offer their donations, because the reverend fathers never failed to assure the visitors, that the healing virtues of this water proceeded from a particular sanctification the holy Keby had bestowed upon it; and so late as about forty years ago, several crutches, wheelbarrows, and other implements, that were used to help the decrepit to Langybi, were hanging round this Mineral-water fountain, in testimony of their recovery.

AFTER the reformation, and even to this day, the bathing in this water, for many diseases, has successfully continued; but in our own times, its reputation extended itself not much farther, than to that part of Carnarvonshire, where this fountain is situated. In this situation it remained without exciting any ones curiosity, till within these last fifteen years, when the reverend Mr. Williams, of Ty Newyd, rector of Llanystimdwy, being informed, that extraordinary cures had been effected by this water on persons then living, made strict enquiries

ries after them, and was convinced of the truth of the reports upon the authority of unexceptionable witnesses; and not contenting himself with the testimony of others, he himself attended many, whom he knew to be afflicted with chronical disorders, and discovered, by his own observation, that they received the greatest benefits from the use of this salutary Spring.

Thus convinced of its virtues, he informed the Proprietor William Price, Esq; of Rhiwllass, who caused proper conveniences for Bathing, and other improvements to be made, at his own expence; so that the public are indebted to these two worthy Gentlemen, that this excellent Mineral-water has recovered its ancient reputation, and that a rational use of it is introduced for the benefit of many afflicted sufferers.

THE Reverend Mr. Williams collected the Cases in miniature, of such who had been cured or relieved, with great caution; he did not rely upon second-hand authorities,

ties, but applied to most of the persons themselves, who were so much obliged to the virtues of this Water, that he might with a positive precision assert them by name; and here I beg leave to communicate them to the Public, in the manner I received them from this worthy Gentleman; and though no exact method is observed in them, yet, as they speak truth in that bluntness, as is ingrafted upon uncontrovertible facts, I should do them an injury, if I presented them in any other dress; I will begin with *Blindness*.

1. JOHN JONES, of Ty-ynygarn, in the parish of Llangybi, was seized with the Small Pox in March 1756, then fourteen years of age, in which he lost the sight of both eyes, in such a manner, that he was quite blind; there was a perfect film or skin over his eyes, which was visible in the plainest manner to every beholder; being in this situation, he made use of our Llangybi Mineral-water the succeeding summer, and by frequently washing his eyes with, and often bathing in this Mineral-water, was perfectly cured, and ever since remained completely well,

well, and not the least sign remaining, that there ever has been a film upon his eyes.

2. A woman of Trevaes, in Mellthyrn, became blind by the Small Pox, and was cured by Llangybi Waters.

3. Mr. John Jones, of Bronygader, about twenty-six years ago, lost his Eye-sight in the Small Pox, but was cured by our Medical-water at Llangybi.

4. A woman in Pwllheli perfectly restored to sight, which she had lost in the last mentioned distemper : As likewise,

5. Mr. Hugh Jones, of Tanygraig, was freed from the same complaint, proceeding from the very same cause.

6. A son of Richard Hughes, of Cariog in Llyn, (his eyes after the Small Pox were in a most dismal condition,) was cured by Llangybi-water in the year 1763.

7. ANNE SION, blind and lame after the Measles, was cured of both by Llangybi-water.

8. Mr.

8. MR. William Pritchard, of Brynbychan, after trying many remedies ineffectually, was cured by this Water of a Blindness, in the year 1764.

9. ELLIS RICHARD from Anglesea, who had a dimness of one eye, with a spot of blood upon it, was perfectly cured by Llangybi Mineral-water, and comes annually out of gratitude to the Well.

10. JOHN RHYDDERCH, after having lost his eye-sight for about thirty years, came about four years ago, and by only washing his eyes for about three weeks, he perfectly recovered, and continues well.

11. A young man from Holyhead lost his eye-sight at sea, and became quite blind; by the helps of Llangybi-water he recovered so much, in a few days, that he was able to see trees; but for want of subsistence could not continue any longer at the Wells.

12. THE son of Mr. Evan Griffiths, of Criekieth, was, in the spring in 1758, at the age of five years, seized with the small pox, which left one eye in a very dismal

con-

condition, for which he sent him to Llangybi Well, where he was perfectly cured; and the said Mr. Evan Griffith remembers, that about a dozen or more recovered the same season of sore eyes after the small pox, by the use of this water.

13. ELIZABETH RICHARD, of Pentraeth in Anglesea, about four years ago, came quite blind with both her eyes to Llangybi, and was perfectly cured by this Mineral-water.

IN *wild Warts* the Llangybi water is, by the common people in that neighbourhood, looked upon as a never-failing remedy; and the following persons have been found, which certainly have been cured of wild warts by this medical Mineral-water.

1. A WOMAN from Anglesea, was perfectly cured of a wild wart, of a considerable bigness, in one of her ears, by the Llangybi-water, and she comes annually to this Well, and uses the water as a preservative.

2. JOHN JONES, of Llewylndin in Llŷn, was cured by this water, of a very obstinate wart upon his lip.

3. JOHN

3. JOHN HUGHS, a smith, from Llyn, was in the year 1763 cured by the Llangybi-water, of a wart within his mouth; also of the same complaint; 4. An old man from Beaumaris; and, 5. John Rowland of Morfa, who comes every year to Llangybi Well, and uses the water as a preservative.

6. MORRIS KADWALADER was, by the help of this Mineral-water, cured of a wild wart, or swelling upon the crown of his head, of about the bigness or breadth of a hand, which did bleed as often as he bathed it with this Mineral-water; but did not so at any other time, when he made use of common water for bathing.

7. GRIFFITH MARK, innkeeper and carpenter, in Llangybi, about thirty years of age, was afflicted with a wild wart on his gums in the mouth, for which he used several remedies that were recommended him by the Faculty, but without any good effect whatever, and the wart grew daily bigger; in this situation he had recourse to the Llangybi Mineral-water, and by this only he is perfectly cured, and remains well ever since, which is now near four years.

8. Hum-

8. HUMPHREY ROBERTS, of Tach, was freed of a wild wart by the help of this Medical-water; as were, 9. Three children of Griffith Humphreys, of Llangybi; and, 10. A child of David Ellis, of Orfedd.

THE Llangybi-water has also a very great reputation in curing the *Rheumatism*, by bathing; and we may rely on it as a certain truth, that those we mention here next, are actually entirely freed and relieved from the rheumatism, by bathing in this water.

1. THOMAS JONES, of Carangwynion, near Carnarvon.

2. A DAUGHTER of Richard Morris, of Tyddyny Morthwl, in Llanystimdwy parish.

3. MARTHA, the wife of Richard Sion Davis, of Llangybi, who was quite disabled by the rheumatism.

4. ROBERT SION DAVIS, of Llangybi, about sixty years of age, was six years ago in frosty weather seized with a violent pain in the thigh, which continued upon him for more than nine months; in which time he
tried

tried many medicines, but all without any effect, and never could be prevailed upon to make use of this our Mineral-water, altho' advised to it by many; however, it happened that by some accident or other he fell into this Medical-fountain, wetted himself much, continued in his wet cloaths, and slept in them, which gave him so much ease, and relieved him of his pains to so great a degree, that it encouraged him to bathe regularly, which he did but a few times, when he was compleatly cured.

6. WILLIAM SION THOMAS, a taylor, of Llangybi, was seized with a sharp pain in the nose, for which he used several remedies to relieve himself from it, but all without any effect; he therefore had recourse to the Llangybi Medical-water, and by five or six times regular bathing in it, was restored to perfect health.

IN *Lamenefs* our Llangybi Mineral-water has also a very great reputation; but in this particular we can only bring two cases in evidence; which are, 1. Ellin the wife of Robert Sion Davies, of Llangybi, who is
now

now about fifty-eight years of age, was at the age of twelve years so lame, that she could scarce move her knee, the sinews were supposed to be contracted; and having applied several remedies to little or no purpose, was at last perfectly cured by bathing in Llangybi-water, and has ever since remained well.

2. MR. Thomas Griffith, at the age of twelve years, was suddenly seized with an inflammatory swelling in his left leg, with very great pains, which at first was moving, but at last settled itself in the smallest part above the ancle; and as he could get no relief for this violent pain, he had recourse to Llangybi-water, which caused the swelling to break, and eased him of his pain; he applied nothing else, but continued the use of this water, by which means the ulcer digested in such a manner, as to heal, and has had no return ever since, which is now thirteen years at least.

THERE is no manner of doubt, but this our Mineral-water deserves the very great encomiums, which are bestowed upon it

for curing the Rickets ; but as the same may be performed with any other water, I will not trouble my readers with cases of cures performed in this disorder ; nor will I recite here what I am informed of, concerning the service it has done in cutaneous eruptions, ulcers, &c. because I have, in its proper place, some particular cases of these kinds to relate, that come within my own observation.

C H A P. III.

Contains the Experiments that are made on Llangybi Mineral-water, with the Corollariis, that are drawn from these Experiments.

FROM what has been said it is most manifestly evident, that the Llangybi Mineral-water deserved to be introduced into the best company ; and very happy it met with patrons (tho' they are rare to be found) that were ready to improve it for public utility in the most solid manner ; it was therefore required of me to make the Experiments in the most careful and exact manner

as

as possible, which I did at the fountain head, at two different seasons of the year, the first was on May 5 and 6; and the second on Dec. 6. both in the year 1766; at the first time, the wind was south-west, and dry weather; on the second, in December, the wind was north-east, and exceeding dry weather for some time; insomuch, that all the neighbouring springs at Llangybi were greatly lessened, and some entirely dried up. It is to be observed, that dry or wet seasons have very little effect upon Llangybi Mineral-water Spring, to lessen or increase the quantity.

Experiment 1. Llangybi Mineral-water has a harsh taste, inclining to a bitter; it will not lather, and soap is with great difficulty mixed with it.

Exper. 2. At the fountain head, oil of Tartar per deliquium, causes a white pearl colour in the water; and by standing precipitates a white powder; but when the water was carried in close corked bottles to Tynewydd, which is about three miles distance, oil of Tartar had no manner of effect upon it.

Exper. 3. With syrup of Violets this water strikes a pale green, but on standing contracts a stronger green.

Exper. 4. With oil of Vitriol this water becomes instantaneously extremely hot, air globules line the sides of the glass in very great plenty; and as the water becomes cold the globules disappear, and a transparent white sediment remains in the water.

Exper. 5. Spirit of Sal ammoniac changes this water into a pearl colour.

Exper. 6. Powder'd galls change this water when cold into a transparent yellow; but when this mixture is exposed to the fire, an opaque blackish brown colour ensues.

Exper. 7. Corrosive sublimate mercury causes on the surface of this water a variegated beautiful film or cuticle, inclining to the colour of peacocks feathers.

Exper. 8. Powder'd Cochineel causes in this water at the well a purple colour; but when the water was brought to Tynwydd House, and exposed to the fire with powder'd Cochineel, it changed into a claret colour.

Exper.

Exper. 9. Fernambuco tinges this water into a disagreeable yellow.

Exper. 10. Spirit of Hartshorn makes no alteration in this water.

Exper. 11. Aqua fortis mixes with this water without any motion or alteration.

Exper. 12. It is the same, and no manner of alteration when mix'd with Spirit of Vitriol.

Exper. 13. Llangybi Well-water is about ten grains heavier in a pint than Tynewydd house Pump-water.

Exper. 14. River-water is from 18 to 20 grains lighter in a pint than Llangybi-water.

Exper. 15. Sea-water is about 40 grains in a pint heavier than Llangybi Mineral-water.

Exper. 16. With sugar or salt of lead this water changes into a milk colour.

Exper. 17. Sugar or salt of lead dissolved in Rose-water, causes no manner of alteration, but mixes and unites most intimately with it.

Exper. 18. Oil of Vitriol precipitates the salt of lead in the mixture of the 17th Experiment, but makes it scarce warm, and by no means causes that violent heat as in Experiment 4.

Exper. 19. White vitriol dissolved in rose-water causes no change or any precipitate, but unites very intimately with the Llan-gybu water.

Exper. 20. Corrosive sublimated mercury dissolved in rose-water, is the same as the foregoing Exper. 19.

Exper. 21. Sal ammoniac dissolved in rose-water, makes no alteration when mix'd with Llangybi-water.

Exper. 22. Alum dissolved in rose-water, is the same as Exper. 21.

Exper. 23. Tincture of rhubarb mixed with Llangybi-water, does not change the natural colour of the rhubarb.

Exper. 24. A Florence flask, with silver leaves in it, filled with Llangybi-water, were boiled and evaporated in a sand heat, till about two ounces of water were left, when
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the silver leaves not in the least changed colour, and the water remained clear.

Exper. 25. One gallon of Llangybi-water distilled in a glass retort, leaves a sediment from 50 to 60 grains.

Exper. 26. This sediment contains about 10 or 12 grains of a slimy transparent substance, which burns immediately as soon as it comes near the fire, and emits a suffocating smoke, attended with a sour smell, not unlike that of burning foot, but not any kind of salt is to be found in this sediment.

Exper. 27. The remainder of this sediment is an extreme fine white earth, upon which neither the strongest alkalies or acids have any effect.

Exper. 28. This white earth will in smelting mix with silver, in the manner as Lapis Calaminaris does with copper, but in proportion makes the silver more brittle than Lapis Calaminaris does the copper.

Corollary 1. From the 1st and 2d Experiment it appears, that this water contains a dissolved earth, and that the menstruum

which expands this earth in the water is of an extreme volatile nature, and for this reason must be used on the spot; but this indeed is no more than what is the case with most, if not with all Medicinal Mineral-waters, which at the spring-head only are efficacious.

Corol. 2. The 3d Experiment gives some faint signs of an alkaly, but it is so little, that, exclusive of this Experiment, I could not find it in any other shape, nor meet with the least trace of it any where. And the 4th Experiment is an evident demonstration, that this water contains a very great quantity of volatile mineral spirits.

Corol. 3. The 5th Experiment proves, that the earth in this water is dissolved by a volatile acid; and this is also confirmed by the 6th Experiment,

Corol. 4. The 7th Experiment proves, that the phlogiston is in extraordinary great quantities contained in this water; because, when water is thus plentifully charged, or as it were overstock'd with the phlogiston, it will then show itself in several colours, as soon as any mercurial preparation is mixed with it.

Corol.

Corol. 5. Experiments 8 and 9 demonstrate, that these waters have their course thro' several minerals; and from hence it is, that they destroy the natural beauty of these fine colours; and Experiment 10 shews, that the acid in this water is so small in quantity, that a compleat volatile alkaly can have no effect upon it: and by Experiments 11 and 12, the alkaly in this water is so little, that (as we have already observed) without the syrup of violets, it is not discernible.

Corol. 6. The Experiments 13, 14 and 15 inform us, that this water is not overcharged with such heavy contents to make it dangerous for any internal use; and therefore we may, from these Experiments, declare it a safe internal Medicine, as well as an external one.

Corol. 7. The Experiments 16 to 22, instructs us of the great affinity this water has with such metallic and mineral preparations, that are used in all disorders of the eyes; because this water mixes with it without any effervescence or ferment-like motion, which if it had, it would be an unsafe ophthalmic, or remedy for the eyes.

Corol.

Corol. 8. I cannot well account, how it comes that this water, Exper. 23, does not change the colour of tincture of rhubarb; because we have seen, in Exper. 8 and 9, what effect it has upon cochineel and fernambuco; unless it be, that the colour in rhubarb is of a more earthy nature, which I fancy is the case; because rhubarb is a root, cochineel an insect, and the fernambuco a fine bark; and therefore it does not affect the rhubarb so soon as the finer dyes.

Corol. 9. Exper. 24, is a most certain Evidence, that there is no sulphur or brimstone in this water; because, were there ever so little in it, even one grain in a pound weight of water, in this Experiment, by boiling the silver leaves with it, they would have changed their bright colour; and thus, by the smallest quantity of brimstone, these silver leaves would have been robbed of their natural splendor.

Corol. 10. By the Experiments 25 and 26 we are informed, that the sediment, after distilling the Llangybi-water, contains a slimy transparent substance, which, if exposed to it, very quickly catches fire; from whence

whence it is plain, that this mucilaginous matter contains the phlogiston: I believe there are few Medical Mineral-waters known, that are so replete in phlogiston as this of Llangybi; and as it is so well mixed, to stay to the very last with the metallic earth, we may, with great reason conclude, that it assists and meliorates the earth, and by this means renders it more fit to produce these salutary effects, particularly in disorders of the eyes, which so often have been experienced from it.

Corol. 11. From Experiments 27 and 28, we learn, that the Llangybi Mineral-water contains an extreme fine, or a most beautiful white earth, which elsewhere * I have called an Undetermined Metallic Earth; the meaning of an undetermin'd metallic earth, is such an earth, as, in its proper nature, is metallic, but never has been in any mixture, to constitute either a metal or half a metal; and hence it is called by the Chemists, the Virgin Earth; or, as all metals and minerals are a compound of several parts, this earth in the Llangybi-water is one of the first or principal parts, that is

* Gentleman's Magazine for July, 1766.

is requisite to constitute a metal, half metal, or mineral; and that it is this kind of earth, no body can doubt, from its easy adhesion to silver when fluxed in the fire; but as this is the first Medical Mineral-water in Great Britain, wherein this curious earth is the principal agent, I will dedicate the next chapter entirely to this earth, and conclude this with

Corol. 12. Naming the contents of this natural composition of the Llangybi Medicinal Mineral-water; which, according to these Experiments, are,

1. A primary virgin earth, of a metallic nature.

2. A very small quantity of alkaly, but no more than what naturally will adhere to this earth.

3. Phlogiston in very great abundance, in-somuch, that it is demonstrable after evaporation in a slimy substance or vehicle.

4. A great quantity of volatile mineral spirits.

5. A

5. A volatile acid, by which all these contents are dissolved and united with the water.

6. Water, as the vehicle to all these ingredients.

C H A P. IV.

A short chemical Dissertation; or a rational Examination, and Inquiry, into the Nature of the metallic Earth, in Llangybi Mineral-water.

I MUST confess, that I am not able to make the Earth, or the salutary agent in Llangybi Mineral-water, intelligible to my readers, unless I have recourse to Chemistry; because this earth happens to be one of the primary principles that enters into the composition of all metals and minerals, or, more properly speaking, is one of the physical causes of their existence.

AL L Metals and Minerals in their natural state are, and after smelting continue to be, a compound of several ingredients; as this well known fact is daily demonstrated, in the mechanical uses of these metallic and mineral

mineral bodies, it is therefore a very natural question, *What are these parts in their primary state, before their progression into the metallic or mineral composition?*

— IT is impossible to answer this question with any certainty, without the help of practical chemistry; because the mathematicians, in all ages, have attempted to determine the first principles of metals, and all other things, by such figures and configurations, which they produce by their several alterations, brought on either by nature or art: but the mischief this kind of demonstration has caused, and the most absurd and unintelligible hypothesis this way of arguing has introduced into Natural Philosophy, are detriments so well known, that I need not repeat them here.

To solve this question by chemistry the true method is, to destroy the composition, by separating its primary parts or first principles; and when thus every species or ingredient, in its single unmixed state, is obtained, examined and made apparent, or intelligible to all our senses, then these first
prin-

principles must be re-united and restored to the same compounded state they were in before their separation. This is the criterion in things of this kind, and indeed the only demonstration that can be admitted, according to the true rules of chemistry; because, by these means, we are able to judge with certainty of compound bodies.

No doubt but it will be objected, that all this is done by art, and that by the means of art, things may be produced which actually are not in nature. To this I beg leave to answer, that nature does the same by length of time, what we do by the art of chemistry in a short process; because, when metallic and mineral ores are come to their proper standard of perfection, and are not molested by miners, they then decay, and are reduced to their first state; because this decay dissolves the union of the composing parts, and restores them to their original nature without alteration: such effects then as we obtain in the Laboratory, by solution and separation, must be exactly the same, as those that nature produces by the helps of decay; and
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if any difference appears the Experiment cannot be admitted, and the operation must be repeated until it is right. In prosecuting the Art of Mining, it is in our power (in case we will not obstinately refuse, and determinately remain ignorant) to make ourselves acquainted with the first principles of metals and minerals; and here I can assure my readers, that a knowledge of this, particularly to smelters, is of the most advantageous consequence; because lead, copper, tin ores, &c. will decay, if they remain too long in their veins and beds undisturbed by miners, yet the primary principles, or those parts they were composed of, will remain unaltered as to their natural state, but yet they will enter into a new generation, and thus compose a different body from that which is decayed.

THE antient Chemists in Europe knew but very little of the original matter, or ingredients, of which the metallic and mineral bodies were composed, that came under their hands. Basilus Valentinus, and a few more, talked of salt, sulphur and mercury,

as the fundamental roots from which all things were generated, and deduced every thing from it, without explaining what they meant by salt, sulphur and mercury. But I beg leave to observe, that I believe they knew no more of these things than the names; and the only use they made of them was, to frame their hypothesis and unintelligible jargon, which they have left us for a legacy.

THEOPHRASTUS PARACELSUS was the first that attempted to realize these three primary principles, and to demonstrate them by manual operation; and it is likewise true, that Theophrastus did but little in this affair; but how could it be otherwise, when he had nothing from which he could draw any instruction, and therefore for every discovery was obliged to hard labour and constant application, by which he so much enlightened this art, that he, at least, laid the foundation for all those improvements we are now blessed with in the Art of Chemistry. I care not for being laughed at for this assertion, (by the Chemicasters of the present age, who despise the memory of old

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honest Paracelsus, because I am sure all true Chemists are of my way of thinking.

THEOPHRASTUS did not alter the antient names of Salt, Sulphur and Mercury, nor did he mend the old theory, but only shewed us the way to get at the primary parts, and for this we are certainly indebted to him. But to distinguish them properly, and to apply them with advantage, was a task reserved to Dr. Becher, who brought these original principles within the reach of our comprehension; because he maintained from experience, that all metals and minerals were a composition of a threefold earth, viz. 1. *A white Earth, vitrifying* in its own nature, and unalterable in the fire; and this he placed instead of the salt of the antients. 2. *An unctuous burning Earth*, which serves for Sulphur; and, 3. for Mercury, a *subtil*, or an *essential penetrating Earth*, which pervades intimately, and combines the two first earths into one substance.

ALL rational Chemists have followed Dr. Becher; and upon this experimentally confirmed system of chemistry, Dr. Stahl made
very

very extraordinary improvements; and since his time, this Science continues to advance upon the same grounds by many, but by none more, than by the Doctors *Pott*, *Marg-graff*, and *Lehman*; a most remarkable circumstance, that three of the first rate, in the Science of Chemistry, are at this time contemporaries in Berlin.

SOME have asserted (of which Dr. *Lehman* is the first) that the inflammable, or the unctuous part, could not properly be called an Earth; he does not deny, but that experience has convinced him of the absolute necessity of the phlogiston in the metallic mixture; but the only thing he contends for is, that it cannot pass under the name of Earth; and upon this supposition he calls these primary principles as follows.

1. *A vitrifying Earth.*

2. *A burning Matter.*

3. *A mercurial Earth.*

IT is true, he argues very plausibly, in observing that the phlogiston, in the manner it comes to our conception, is entangled in a greasy unctuous substance; from which,

according to his assertion, all earth evaporates, when it enters into the metallic mixture. But I must in some measure dissent from him, yet allow, that a great part of the earth, in which the phlogiston is contained, and thereby conveyed to the metallic mixture, will evaporate, but not entirely fly off; because I am convinced from experience, that flame possesses an inseparable earth, which enters into the metallic composition; but as this is foreign to our present design, I will therefore not enlarge upon it.

This Earth then, or primary ingredient to all metallic and mineral bodies, is of a white colour; it can bear the strongest fire without destruction; and in the fire either vitrifies of itself without any addition, or changes into a calx; it contains a small quantity of alkaly, which is so much of its own nature, that it is inseparable from it, and by virtue of the alkaly this earth changes into glass, without any aiding salts: this earth causes in oil of vitriol a reaction, which also proceeds from the alkaly.

OF this kind of earth, is that which we meet with in the Llangybi Medicinal-water,
and

and therefore not unjustly called an Undetermined metallic earth. This is the first Mineral-water I ever met with, within the compass of my own observation, in which an earth of this nature is the medical agent; I was once indeed informed of a water of this sort by a very learned gentleman, the late Rev. Mr. Woyte, inspector of the Lutheran church on the Upper Rhine; but that he told me of must be impregnated with a much greater quantity of white earth, than this at Llangybi; because he assured me, that it caused a precipitate of white earth in its passage from the spring; and when two or three spoonfuls of this precipitate are put into a bottle, and immediately filled up from the spring, will be a means that the water can be carried to distant parts for medical purposes; all this cannot be done by the Llangybi-water, because there is no precipitate in the current.

I FORESEE it will be objected, that, according to the related experiments, the quality of causing a motion in oil of vitriol, is wanted in the metallic earth extracted from

the Llangybi Mineral-water. To this I answer, that this earth, by the help of acid, is united with the water at Llangybi, of which, after being separated and purified, so much remains, that neither the acid nor alkaly can have any effect upon it; but that this earth mixing with smelted silver, is an indisputable proof, that it is one of the primary ingredients to all metals and minerals, and is that identical earth which, by Becher and Stahl, is called the Glass, or the Vitri-fying Earth.

THAT this white primary earth cleaves to all metallic or mineral ores, most evidently appears in all kinds of smelting-houses, and therefore will not admit of any dispute; but be it remembered, that this white metallic earth has no connection or relation with white clay, chalk, or such like stuff; the purest and easiest to be met with, is in such lead or copper ore veins, as are full of Blende, Mundic and sulphureous Marcasites, a mixture very hard and difficult for Miners to work upon; amongst which, in lochs, small caverns, or openings, this white earth very frequently appears, in
a state

a state like cream or thick buttermilk: and when this happens, it is at all times an exceeding good sign, because it indicates that a body of ore is near, which, by a natural exhalation, sends the superfluity of it to those covering minerals which stand in need of it.

THE next ingredient of consequence in Llangybi-water is the Phlogiston, which appears to me the corrector of the white metallic earth. The Phlogiston is the second physical cause of the existency of metals and minerals, and is therefore the next in the natural course to the white earth, and is generally called Becher's second earth, which undoubtedly deserves our consideration; and its correcting the white earth, I attribute to the greasy unctuous state we find it in, which otherwise would be too drying in disorders, were it not for the phlogiston that is mixed with it.

DR. BECHER calls the phlogiston an Inflammable Earth. We have already observed, that Dr. Lehman will not permit the

name of Earth to this second metallic principle, but says it is, *a light essential substance, of which the greatest part is a burning volatile salt, and a small quantity of water without any earth.* There is no manner of dispute, but that the phlogiston from minerals, and indeed animals and vegetables, in a separate state, at all times appears to us in a greasy unctuous substance; but it does not follow from thence, that it should be destitute of all sorts of insoluble earths: however, as this is quite foreign to the affair in hand, I will not enter further into the subject of the primary parts of the metallic and mineral bodies; all that I here aim at, is to make the contents of Llangybi-water as intelligible as possible, to those that are unacquainted with *Chemia Physica*.

I SHALL conclude this Chapter with observing, that the Phlogiston, or the inflammable matter in the mixture of the Mineral-water of Llangybi, like the foregoing, owes its origin to those Minerals (whatever they are, I cannot presume to determine) through which these waters percolate ;

late; that this inflammable Earth, in this Mineral-water, is demonstrable in an unctuous substance; and that it is so well mixed with the white metallic earth, to adhere and remain after the water is exhaled, is manifest from the Experiments related in Chap. 3. And for this, with many other reasons, it must be a sure Correcter and Improver.

C H A P. V.

The medical Contents of the Llangybi-water considered; of Cures that have been performed within the Author's Knowledge, and some under his Inspection; with Directions for using these Waters.

ALTHOUGH there never has been a Mineral-water in Great Britain offered to the Public as a remedy for the eyes, yet it is no new thing, to use particular Mineral-waters with great success in diseases of the eyes.

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THE first remarkable cure of a person totally blind, I find on record, by Mineral-water, happened in the year 1583, which was performed by Pyrmont Water. The Patient, being a poor man, was charitably maintained by a clergyman, chaplain to the then Prince of Pyrmont; the particulars of this blind man's case is not related; but we are assured, that he was totally deprived of his eye-sight, and that he was cured by drinking the water, and by frequently applying the natural precipitate of these waters to the eyes. The perfect recovery, or cure of this blind man, caused in those times such surprise and astonishment, that it was inserted, as a prodigy, in the Imperial Chronicle of the Emperor Ferdinand I. in whose reign this marvellous cure happened to be performed; and the Prince of Pyrmont settled a pension for life upon him; and since this period, there is a long register in the Medical History of the Pyrmont waters, * of cures, that have been performed on disorders in the eyes.

* This Medical History was published in the year 1750 by Dr. Seip, Physician in Hamburg, son to the late most learned Dr. Seip of Pyrmont.

THE waters of Driburg, in the Bishoprick and Principality of Paderborn, are of the same nature as those of Pyrmont; and according to Dr. Rodders's account, they are externally used, with great success, in many disorders in the eyes.

DR. HENCKEL informs us of the like good effects of Lauchstedter water; he is very particular in relating the cases, and the names of such as have been cured of cataracts, films or pearls, only by outward application of that Water: and the late most learned Dr. Hoffman, has also left us several cases of extraordinary cures, that have been performed in disorders of the eyes, by the Lauchstedter and other Mineral-waters.

DR. RUTTY, in his Synopsis of Mineral-waters, page 470, under the rubric of Marl, and Lac Lunæ, names several white earths soluble in water, and therefore ranges them amongst the ingredients that mix with water; but I cannot find that he mentions, or is acquainted with any water like that of Llangybi, in which the medical agent is marl, lac lunæ, or any other white earth;
but

but he informs us, from his own experience, and from other authors, that this white earth is serviceable in many disorders, and that what he calls Unicornu Fossile, has been used with great success in eye-waters, and pustulary eruptions. Dr. Rutty mentions many other waters that are efficacious in particular eye-distempers; for example, the Cheltenham waters are recommended, from experience, in inflammations of the eyes; the Streatham and Franvillstreet-waters have signalized themselves on the same account; and the Nevilholt-waters, not only in inflammations, but also in great relaxations in the optic nerves.

I COULD name many more Waters of the same nature; but let these be sufficient to demonstrate, that there is nothing new in the recommending of Mineral Waters for disorders in the eyes; and when we examine the waters I have taken notice of, or inspect the Experiments that are recorded of them, we find that they are replete in that white metallic earth, which is the chief medicinal agent in the Llangybi-water; wherefore we may justly conclude, that the
cures

cures are chiefly performed by this primary ingredient of all Metallic and Mineral productions.

SUCH waters as contain a dissolved earth, and are no way naturally connected or related to that, as is in the Llangybi-water; for instance, iron earth, without this white earth, and all iron preparations, are extremely hurtful and pernicious to the eyes; from whence it is most manifestly evident, that the cures of eye-disorders can be attributed to nothing else, but to this white undetermined Metallic and Mineral Earth: and as the Llangybi-water has not any other earthy or metallic contents in its mixture, that might protract the salutary qualities in the application, it may justly claim the pre-eminence, as an Eye Medicine, to any other remedy or water whatever.

DISORDERS of the Eyes, like all other Distempers, proceed from various causes; the first, and one of the most common, is in the blood; because, if an irregular circulation brings on a conflux of blood and animal fluids about the optic nerves, inflammation,

mation, films, pearls, cataracts, chemosis, and many other most afflicting ailments may ensue : secondly, all these before named dismal diseases, and several others, may proceed from coagulated blood in the stomach or viscera. The cure in the first of these cases, must be promoted in assisting Nature, to bring on a regular circulation by the natural secretions ; and in the second, the stomach and intestines must be cleared with mild purges, before any outward application can be admitted ; and violent evacuations must be avoided in both. In all these circumstances then, no place can be more happily situated than Llangybi, within a small distance of the sea ; because Llangybi and sea-water mixed, make not only a pleasant, but a very mild purge for these purposes ; and when by such means the patient is prepared for external remedies, then the Llangybi Waters, only by bathing and outward applications, will soon compleat a happy cure.

HOFFMAN, and several other first-rate Writers, enumerate the causes from whence the disorders of the Eye proceed ; such as
Eruption,

Eruption, Itch, Scurvy, Erysipelas, Ruby-coloured Faces, Scald or Scabby Heads, &c. which, if not taken care of in time, frequently terminate in a total blindness. *Hoffman* never recommends an artificial medicine for a curative intention, without a proper caution in the administration ; he being well acquainted with the *Materia Medica*, and therefore knows the melancholy circumstances that must ensue from a male-application ; and as the eye is a most tender and delicate member of the human body, a more than ordinary caution is required in the use of artificial Collyriums ; for by a trifling mistake, irretrievable mischief may be brought on ; but it is not so with the Llangybi-water, being from experience convinced, that even a very irregular use has been beneficial to bad eyes.

THERE is hitherto no other means of relief discovered for Cataracts but manual operations ; *Boerhaave*, *Heister*, *Petit*, and several other eminent writers, are of opinion, that it is a very great mistake, even to think of a medicine, for the cure of Cataracts, the operation they all advise ; but at the same

same time allow, that no certain method is as yet known, to ascertain a probable success; which is at best but chance, because experience, in these operations, has produced nothing but doubts; some having appeared so extremely well, when the operations were performed, that they in a manner presaged a certain success, yet the conclusion terminated in an irretrievable blindness; and others, who at first appeared very bad, ended in a perfect recovery: thus we see, how little is to be depended on in this way of treating Cataracts; it is certainly true, that I never could meet with, or hear of any one Medicine, that was of real service in this disorder; nor, on the other hand, could I ever learn, that any attempts were made for this purpose. The Llangybi Mineral-water then, is the primary Medicine that is offered to the Public, which possesses the Virtues to cure *Cataracts*, without these uncertain operations.

THE most dismal of all disorders in the Eye, is, without doubt, the *Gutta Serena*, because it comes too often suddenly, without previous indications, and at the same time

time in such a manner, as to be often incurable. A *Gutta Serena* proceeds chiefly from the weakness of the brain, particularly in those parts which are called *Tbalami Nervorum Opticorum*; and all this is too frequently brought on by violent drinking, great afflictions, costiveness, and such like unnatural burthens, which are incident to the human constitution: in these calamities, manual operations are intirely out of the question, and the poor sufferers are directed to the medical assistance. Mr. St. Yves, and others, who have professedly wrote on the disorders of the eye, pointed out the proper methods for these purposes. But here I beg leave to observe, that they who labour under a *Gutta Serena*, (if a cure is yet possible) should it be in their power to make use of the Llangybi Mineral-waters, will find them much preferable to any other medicine whatever.

No one can doubt the antiquity of Bathing; and when we consider the uncleanness we bring with us into this world is such, that the very first thing we want is washing, or a cleansing Bath, we may justly conclude,

elude, that bathing is of as long standing as the birth of the first man; and is by all authors, from the remotest antiquity, both sacred and profane (Moses not excepted) recommended as a remedy, or spoken of in a medical sense.

IN *Hippocrates's* time, it was so well understood, that he and his cotemporaries knew what solid and liquid contents would enter, or be taken up, in bathing, by the external body, and thus conveyed to, and mixed with the blood; in consequence of their knowledge, they invented several sorts of ointments, which by means of bathing were conveyed into the body; and for this reason *Hippocrates* is very exact and particular in directing what preparations are proper before bathing is entered upon.

WE have already observed, that the Medical Virtues of the Llangybi-waters arise from the White Metallic Earth, which is so plentifully united with the Phlogiston, as to remain with it after evaporation like an unctuous matter; so that in bathing the whole enters like an ointment, and mixes
with

with the blood; therefore we need not wonder, that it should without pain corrode a film upon the eye, purify the blood, or remove an obstruction in the irritable parts of the body, and be equally salutary in scrophulous, rheumatic, nervous, and several other complaints. Nor was it without reason, that the ancient Alchymists bestowed the greatest praises on the original contents of metals and minerals, since their assertions are verified by a long and successful experience.

I NEVER could learn, that the Llangybi Mineral-waters were ever tried in cancerous complaints; but I apprehend they would be of the greatest service in this miserable disorder, because the corroding matter in a cancer is an *Acidum volatile corrosivum*; and this earth is the most accomplished alkaly in nature; and such Chemists as are acquainted with the process, to separate this metallic earth properly from antimony, are possessed of a noble remedy against the Cancer. But as this earth in the Llangybi Mineral-water is much better prepared in Nature's Laboratory, than possibly can be done by art, it

is therefore much preferable, particularly as it can be conveyed through all parts of the animal body by two methods, viz. by Drinking and Bathing. As several kinds of Cures have been performed by the Llangybi Mineral-waters within my knowledge, and some under my immediate observation, I therefore beg leave to relate them.

IN the spring of the year 1766, I met with a poor young woman, then 19 years of age, of a good strong make, but all over full of itch, to that degree, that she was thereby greatly emaciated; six years before she lost her right eye by the small pox, and on her left had a pearl covered all over with a film, in such a manner, that it was very near being a complete cataract, and she could hardly see any thing with this eye: I sent her to Llangybi, where, by a long use of the Mineral-waters, she has recovered the sight of this eye, the film being gone, somewhat indeed yet remains of the pearl, but I have great reason to expect, that using them another season, will intirely expel the rest.

2. EARLY in the summer of 1766, was brought to the Llangybi Mineral-waters, a girl from five to six years of age, whose eyes were inflamed in a violent and painful manner, the optic nerves being totally relaxed, the eye-lids distorted with a chemosis, and a film beginning to appear, with a plentiful discharge of a most acrimonious humour, which from the external air very quickly changed into a gum, and thereby greatly increased the pain; she was a truly pitiable object; many medicines had been prescribed in vain; she was greatly emaciated, being afflicted with an eruptive disorder all over her body, as well as with the inflammation that attended her eyes, which last was so great, that it was apprehended a total blindness would ensue; however, by bathing in the Llangybi-waters, and very frequently washing her eyes with the same, she is perfectly recovered.

3. IN the beginning of May 1766, a labouring man that lives in the neighbourhood of Llangybi, from forty to fifty years of age, came to me for my advice, being greatly

afflicted with a scrophulous complaint; on the glands about his neck, and under the right arm were many boils, as large as pigeons eggs, and some few not less than hens eggs, of a blue disagreeable lead colour, and some discharged a most acrimonious sour liquor: I recommended to him to drink every morning a pint of Llangybi-water, mixed with an equal quantity of sea-water, and to bathe every evening in the Llangybi Mineral-water. On June 30 following I saw him again at the Well, when he was bathing; and then I found his boils and ulcers were greatly lessened, of a natural flesh colour, his looks much improved, and he confessed himself much better, by following my advice. In the beginning of last April I enquired after him, when I was informed, that all the ulcers and boils about his neck and body were healed and gone, but that his legs were become ulcerous, with a great discharge. And here it may not be improper to observe, that this man for several seasons had made use of the Sea-water, both in drinking and bathing, but never with any success.

4. A poor lad, from 13 to 14 years of age, with a scrophulous infection, and several of these kinds of ulcers upon his arms, which discharged nothing else but a sour smelling ichor, was, in the summer of 1766, at the expence of a charitable gentleman, sent to Llangybi, and to him I recommended the following method; to drink morning and evening half a pint of Llangybi Mineral-water, mixed with the same quantity of Sea-water, to bathe twice a day, before and after dinner, in the same Water, and keep constantly rags moist or wet with the same Water upon the ulcer, by which means they discharged a laudable pus, and healed. I have been informed, that this young man had made use of the Sea-water without any effect, some time before he came to Llangybi.

5. CATHARINE JONES, from the parish of Llangybi, came for my advice in the beginning of the summer 1766; she was then twenty-one years of age, but of a very small tender make, and a delicate constitution, without being distorted, or having ir-

regular limbs, she had not the least appearance of the Catamenia, but was afflicted with many scrophulous swellings about her neck, armpits, and many other parts of the body, but none of them were broke, or discharged any ichor; she was troubled with this disorder for about three years, since which she bathed every summer in Llangybi-waters, but without any relief, her distemper on the contrary daily increasing; but as she had only bathed in this Mineral-water, I recommended to her half a pint of Langybi, and the same quantity of Sea-water, to drink twice a day, and to bathe constantly one hour before dinner, and three hours after; by these means, several of her swellings broke, discharged good pus, and healed, the rest of them disappearing; ^{But no sign of Catamenia} so that I am afraid it will not be a lasting cure. The reason for relating this case is this, that she got so much better, when the natural obstructions continued to remain; I saw her on the 6th of April last, when she was perfectly chearful, and not in the least incommoded from her former complaint.

6. THE same summer, at Llangybi, I saw a weaver's apprentice, that was greatly infected with the scrophulous disorder, and to me appeared past all help; however, to my great surprize, was much relieved by a short and irregular use of the Llangybi Mineral-waters.

7. MASTER Morgan Griffith, a child of four years of age, was, in the beginning of the year 1766, seized with a secondary ague; after two months continuance it changed to a daily one, and was very severe for four or five days, which very much emaciated him; his belly swelled, and a kind of asthma joined all these complaints, so that all the month of March he was not able to get out of bed; in this condition he was in April brought to Llangybi, and bathed in the Mineral-waters when the fit came on him; and by this means only he is perfectly recovered.

8. MISS JONES, eighteen years of age, was in January last seized with a secondary ague, the hot fits of which were very severe:

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in this manner it continued for two months, during which time she took a great quantity of Peruvian bark in red wine, without any effect; whereupon she resolved to bathe in Llangybi Mineral-water, by which means she was perfectly cured.

9. MARGARET GRIFFITH, twenty-six years of age, in January last fell sick, her disorder terminated in a secondary ague, for which she tried several remedies, for about eight weeks, without any help; at length, she bathed in Llangybi Mineral-water, and was thereby perfectly cured.

10. IT is very remarkable, that bathing in the Mineral-waters at Llangybi is a certain remedy in all sorts of agues; for when I was the last time there, and seemed surprized at this extraordinary quality, one Griffith Humphrey, seventy years of age, who was born there, and always lived in the parish, assured me, that the ague-cures, as long as he can remember, by bathing in this Mineral-water, are so certain and frequent, and the inhabitants of Llangybi so much familiarized to it, that they look upon it as a trifling

trifling performance ; and that he himself, about twenty-five years ago, was seized with a Tertian ague, and did not chuse to make use of the Mineral-waters, but used many other remedies without success ; this ague continued on him longer than twelve months ; and as he could find no other relief, was obliged to bathe in that Water, by which he was completely cured, and never has had any relapse.

II. BEING persuaded from several motives, that this Mineral-water must be very beneficial in scald or scabby heads, and having, in the year 1766, acquainted myself with the case of a poor young man, about eighteen years of age, who ever since he was three years old has been severely afflicted with a head of this kind, insomuch, that in my whole life I never saw one worse, I recommended him to a charitable gentleman, who upon my suggestions, that the Mineral-waters at Llangybi might be of service to him, was at the expence of sending him there ; my directions to him were, to drink a pint of Mineral, and the same quantity of Sea-water mixed, every morning, and half a pint of each going to bed ;

bed; to bathe two or three times in the same Water; and constantly to cover his head with a cap made wet with the Water; by these means he greatly recovered; and had he continued at Llangybi the time which I at first prescribed, and followed the above directions, there is no doubt but the cure would have been compleated.

FROM what has been said, we may conclude with certainty, that this Water is good for all disorders of the eyes, (cataracts not excepted;) and all disorders that are attended with large boils and tetter, such as King's Evil, and all kinds of scrophulous Kernels, Swellings, Scald Heads, and ulcerated Legs; in all Eruptions of the Skin, Itch, Leprosy and Scurvy, Wild-warts and Rheumatisms; in all nervous Cases, and Palsy, Rickets, Lameness, and Convulsive Fits.

As soon as possible, I will try the virtues of this Water on cancerous patients; and therefore will annex the method I intend to make use of on that occasion, to the following Directions.

I. Direc-

I. *Directions to be observed in Disorders of the EYES.*

IN all disorders of the Eye evacuations are necessary ; therefore as soon as the patient arrives at Llangybi, let him be blooded ; and for about six or seven days, let him drink early in the morning, and at night going to bed, an equal quantity of Mineral and Sea-water mixed, as much as will cause two purging motions in twenty-four hours. Evacuations in these diseases must be very mild ; in the time that the waters are taken for purging, let the eyes be washed at least once every hour ; and when the days for evacuations are ended, then let the patient bathe once a day in the Mineral-water, always dipping his head under, as often as possible, to wash his eyes with the same water, and constantly keep rags made wet with it upon the eyes ; and if, in the course of bathing and washing the eyes, a costiveness should ensue, then a small quantity of the Mineral and Sea-water mixture ought to be taken early in the morning, and at night going to bed.

II. *In the KING'S-EVIL, or Scrophulous Cases.*

IN this disorder, I cannot advise universal bleeding, as in the foregoing disorders of the eyes; because in these patients the blood is most commonly too thin, and too quick in its circulations; yet where a plethora is found or observed, there bleeding cannot be dispensed with; but ought to be performed as in the first direction, before the patient enters upon the use of the Waters.

BLEED or not bleed where the King's Evil is the case, the patient must drink early in the morning, and at night, a small quantity of Mineral and Sea-water mixed, so as to keep the body open; and his chief beverage ought to be Mineral-water mixed with milk, or with a very small quantity of brandy; and, according to the strength of the patient, he ought to bathe once or twice a day, to go into bed for a short time after bathing, and to keep wet rags constantly upon the boils or ulcers.

III. *Dis-*

III. Disorders of the Skin, Itch, Leprosy and Scurvy.

THE same rules as I have laid down in the foregoing for the King's-Evil, ought to be, as near as possible, observed in these disorders; and if it should happen, that patients of this kind should be troubled with sour stomachs, then let them take 30 drops of Oil of tartar per deliquium, with a quart of Llangybi Mineral-water; or if they cannot come at this, let them burn Broom, and make a strong Ley of the ashes; and when it is clear, take two or three Spoonfuls of it in a day in a quart of the Water.

IV. In Scald or Scurfy Heads.

I HAVE given full direction in Case 11. of this Chapter; and the method I directed this young man, I recommend to all, who will make use of this Mineral-water for the same complaint.

V. Rheu-

V. Rheumatic Complaints.

IF the patient can spare blood, let a small quantity be taken, then let him purge for three or four days with Mineral and Sea-water; but in case bleeding cannot be allowed, the Water-purges must not be omitted. Let him bathe once or twice a day in the Mineral-water, according as his constitution can bear it, and as often as he comes out of the Bath, go to bed, and take about a quarter of a pint of Llangybi-water, with 40 or 50 drops of Friars Balsam in it; and when costive, let him promote the necessary discharges, by an equal mixture of Mineral and Sea-water.

VI. In Palsies.

IN this disorder bleeding is to be totally avoided; but it is necessary to prepare the patient with gentle purges, before he enters upon the full use of the Llangybi-waters; and this is best done with a mixture of this Mineral and Sea-water, as advised in the foregoing Directions; ten or more days is requisite for this preparation: to this Purg-ing-water mixture, it is necessary to add a few

few tea spoons full of Tincture of Valerian or Friars Balsam, that it may sit warm upon the stomach; being thus prepared, let him bathe in the Mineral-waters according to his strength, once or twice in a day, go from the Bath into bed for a short time, and take a small quantity of the Water, with 40 or 50 drops of Tincture of Valerian or Friars Balsam; and at night going to bed, take two or three large spoons full of Decoction of Wood Soot. This decoction is to be made with two ounces of Soot finely powdered, and three pints of the Llangybi-waters.

VII. *In Spasmodic, Hysterical, and all other Nervous Complaints*, the same method is to be observed, as before directed in the *Palsy*.

VIII. *In a Cancer.*

THE method I intend to observe, whenever I have a patient in this Disorder, is this. Bleeding must depend upon the constitution of the patient, and if the blood cannot be spared, it shall not be attempted; but shall direct to prepare the body, at least for 10 or 12 days, with Sea and Llangybi Mineral-water; to bathe constantly twice a day, and to drink

the Waters mixed, with a small quantity of spiced Lime-water, twice a day, as an alterative; to cleanse the wound often with Llangybi-water, and to dress it with two ounces concentrated Lime-water, one ounce Honey, and half an ounce of Oleum Animalis Empenacumatici. And herewith I will conclude this Subject on the Llangybi Mineral-waters.

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An ESSAY on the Prize Question of the Royal Academy of Sciences and Arts, at Bourdeaux, in France, for the Year 1767, on the Subject of Analizing Mineral Waters.

THE Question, this learned Academy, for this year's Prize, has proposed, is, *What is the best Method for Analizing Mineral Waters? And if Analizing alone is sufficient to enable us to determine exactly their Virtues and Properties?*

THE natural Medical Mineral-waters, are comprehended under the two general names, of *Acidulae*, and *Thermæ*, or sour, and hot waters. Dr. Hoffman, one of the first rational writers on this subject, very justly observes, that this division was too general, and therefore divides them into three classes. However, I will not, in a tedious manner, inquire what others have done, in this respect, but relate my own opinion.

Classification

ACCORDING to my notion, these Medicinal Mineral-waters, ought to be divided into eleven capital classes, of which eight belong to the Cold, and three to the Hot and warm Mineral-waters. And, tho' I propose more classes, than any preceding Writer has done, yet, I am sure, whoever examines this subject, with due attention, will find, that these eleven general classes can bear a great many subdivisions; because these Waters are much more numerous than in general is believed.

*Judge
ment* THE names of those which, according to my notion, are capital Mineral-waters, and will bear subdivisions, are,

1. Chalybeate-waters, with Salts.
2. Chalybeate-waters, without Salts.
3. Acid Waters.
4. Alkaline Waters.
5. Sulphureous Waters, with Salts.
6. Sulphureous Waters, without Salts.
7. Saline Purging Waters.
8. Waters, where a white Metallic Earth only is the Medical Agent. And the natural

ral hot Medical Waters will bear the following three capital Classes.

9. Thermæ, that are extremely hot, like boiling water, and will scald or singe hair and feathers from animals, and harden eggs, in the space of six or seven minutes.

10. Thermæ, of a less degree of heat.

11. Lukewarm, or tepid Waters.

I BELIEVE there is not a subject in Natural Philosophy, or Chemistry, that is so much overstocked with Experiments, as that of Analizing Mineral-waters; insomuch, that it has clouded and perplexed many, that attempted to investigate this subject. However, this is an abuse, and I need not tell my Readers, what is already too well known, that in this, and all other sciences, male application of things, by wrong-headed Experimentalists, will continue to future ages. A great many very able Authors have handled the experimental Enquiries on Mineral-waters with great nicety, yet no one (Dr. Peter Shaw only excepted) has ventured to determine the question, which is proposed by the Academy of Bourdeaux, viz. *What is the best Method of Analizing Mineral-waters?*

ERRORS committed by Analyzers of Mineral-waters are, in this Science, more excusable, that in any other whatever; because so many contrary things, such as acids and alkalies, metallic and mineral parts, saline and earthy contents, are united in one and the same watery vehicle, in a clear, and at the Spring-head, invifible ftate, to the eye, without altering or changing, in any degree, their original nature and properties; a circumftance utterly impoffible in artificial Chemistry. It therefore requires a long and very great experience, before (from the many phœnomenas that occur) certain conclufions can be drawn; because there are but few that can be compared or determined by the rules of chemical Art, yet, notwithstanding this, Chymiftry is the only hand-maid we can make ufe of, for obtaining the contents of thefe Waters.

As many have ventured to investigate the nature of Mineral Waters, we need not to be furprifed, that the Experiments are greatly augmented in a fhort fpace of time; nor is it to be wondered at, that a great many of them

them are Trash, because all Analizers were Chemists; and most of them considered the natural Mineral-water mixtures in such a light, as phlegmatic compounds are prepared in the Laboratory by the art of Chemistry. Many of these Experiments are useless, and others pernicious, in the explanation of this subject, and therefore both ought to be entirely exploded; and if any are to be retained, it should be those, which are in the operation as near nature as possible, simple and plain, without chemical tortures, by which frequently the original state of the mineral contents are changed into other forms or figures, and thus mislead the Analyzer in his operations. And as it is absolutely impossible to imitate Mineral-waters by art, it is therefore but reasonable to conclude, that Experiments, which depend upon the nicest rules of art, cannot be any otherwise but dangerous in their analization.

THE Experiments for the best method of analyzing Mineral-waters are two-fold. 1. Experiments that are general to all Mineral-waters, both cold and hot; and 2. Particular Experiments, such as only are proper for

particular Waters ; and such, as I apprehend to be proper for these two-fold purposes, I beg leave to relate.

1. For the first Experiment, before the Analyzer meddles with Medical Mineral-water, he ought to examine the neighbourhood round about the Spring, such as Hills, Rocks, Quarries, where stones or slates are digged out, Earths, Vales, Ditches, &c. to be able to frame a compleat Geographiam Physicam & Subterraneam, of that circuit in which the Medical Fountain springs forth.

2. NEXT to this, the Mineral-water Effayer must look out, or search for such exhalations of mineral damp, as may come out of the crevices or fissures, from within the stone or slate quarries, rocks or earths ; he must likewise collect and essay such Mineral Fossils, Slates and Stones, as he meets with in the compass he examines,

3. AN Application to Taste, Sight and Smell, may be considered as one of the general Experiments to all Medical Mineral-waters, because the solid Contents
are

are in a dissolved state, united with these waters. But when their taste is changed, and they do not appear perfectly clear to the sight, then their texture is destroyed, and unfit for Medical Use. It is the same with the volatile spirits which are contained in all Mineral-waters, because, when they cease to cause a sensation to the smelling organs, we then may surely deem them unfit for drinking.

4. THE specific heaviness in all Mineral-waters must be considered, and is most certain one of the general Experiments; wherefore the Analyzer must with great exactness ascertain their weight; and very particularly remark, in what degree they differ from other waters.

5. IT is a common received opinion, that the elastic volatile spirits, Medical Mineral-waters in general are impregnated with, cannot be collected in such a manner, as to make them visible or examinable by our senses. But as I can from Facts contradict this notion, I may venture to lay down my method, as a most certain experiment, whereby these Elastic Spirits can be collected fit
for

for examination, from all kinds of Mineral-water; which is thus.

LET a cover of white wood, that is very dry, be made large enough to cover the Well or Fountain-head of the Mineral-water, whose spirits you want to collect; let the cover determine on the top, like the narrow part of a sugar loaf; in which place, fix about a pound weight of spelter, or Zink ashes, perfectly free from other mixtures; but they must be placed in such a manner, that the exhaling or rising spirits of the Mineral-water spring can freely penetrate, and mix with the Zink ashes; and if occasion requires, to take this cover in the day-time from the fountain-head, let it be kept carefully, and replaced in the evening upon the well for all night; and thus continue it for 30 or 40 nights, then wash the Zink ashes with distilled rain-water; sublimate these Zink ashes in a glass retort, and cristallize the water in which the ashes are washed; and by these means, sometimes these spirits appear in a two-fold shape. However, it is not absolutely necessary to wash these ashes, but may immediately out of the

the cover be put into the retort, and sublimated. Either way, the Analyzer will obtain a sufficient quantity of these spirits, in their pristine nature to investigate them. The months of March, April, and May, is the best season for collecting these elastic spirits. N. B. if any fissures in stone or slate quarries, that send forth damps, or mineral exhalations, within the circuit of a mineral spring, they ought to be in the same manner collected and examined.

6. DR. SEIP is the only Mineral-water Effayer I have met with that attempted to collect these spirits, but his method differs greatly from that before related, which is thus, he takes a large quantity of salts, carefully made from that Mineral-water he wants to extract the elastic spirits from, then puts this salt into a retort, and in a sand heat, by the help of the several degrees of fire, distils two or three kinds of liquors from it; of which the last is always the strongest part of the Elastic-mineral-water spirits.

7. IT is most certain, and indeed very remarkable, that these spirits in very great
plenty

plenty will remain united with the salts, and continue so long with them, until these very salts come to be destroyed; and yet these spirits cannot immediately in any shape be distilled from the water; and such Medical Mineral-waters as are destitute of salts, these elastic spirits will in great plenty combine with the residuum after evaporation, from which they may be obtained, in the manner as Dr. Seip distils them from the salts, and therefore this experiment is general.

8. Evaporation is likewise a capital and general experiment for trying Mineral-waters, and is a very good one, if the same is judiciously performed; because evaporation is the only means hitherto known, to come at the salts, and other mineral contents, that are in these watery compounds. In this experiment, it is highly necessary to observe three Rules, with very great exactness, viz.

1. To take a very large quantity of water, at least from 5 to 700 quarts, for the operation.
2. To have patience in the operation, to evaporate slowly in a constant degree of steaming, without boiling; because the motion
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of boiling alters and volatilizes the salts, and disfigures and destroys the other ingredients: and 3. To take care, that in the evaporation no other contents, such as ashes, soot, &c. mix with the water.

9. DR. HENCKEL's Experiment to try for Brimstone in Mineral-waters is this, he directs, to take about nine ounces of the Residuum, after the evaporation of the water, before any of the other contents are separated from it, to levigate and mix with it three ounces of powdered Arsenic, then this is to be put into a glass retort, and sublimated in a sand heat. If the Arsenic, that is thus sublimated into the neck of the retort, obtains a yellow, orange or ruby colour, then there is a perfect Brimstone in the mixture; because Arsenic will receive no colour from any Mineral, but from Brimstone only.

10. DR. SEIP condemns this experiment, because he separated the Brimstone from the Mineral-water salts, when refined from the mineral contents, by sublimation, without the addition of Arsenic; for some of the
Brim-

Brimstone, if there be any in the Mineral-water, will adhere and remain with the salts to the last. Both experiments are good, and neither ought to be condemned ; but that of Henckel's most certainly has the preference ; because, in such Mineral-waters, as have but very little, or no salts at all, in their mixture, it is impossible to come, by any other means, at the knowledge of Brimstone contained therein, but by Dr. Henckel's Experiment.

II. THE contents which are left by the evaporation, ought to be most carefully separated from each other, and scrupulously examined, so that none may be wrong named, or classed, or one species taken for another. In this particular, a very great reformation is wanted, amongst the Mineral-water Analizers ; and of the many mistakes of this kind, which continually happen, I will only mention one ; in the Chalybeate saline, and most other kinds of Mineral-waters, both hot and cold, is a fine white earth to be found, which earth is differently and wrongly named by the Mineral-water writers, some call it *Lac Lunæ*, Marl, Chalk,

Chalk, Allum - Earth, and many other names more : but it is neither one nor the other, they are all mistaken. Dr. Seip is the only author I ever have met with, that has a true knowledge of this earth ; for he justly observes, that metallic ores, and all sorts of minerals, are never without this fine alkaline earth ; and to this I may from experience add, that the mineral damps, in all metallic or mineral mines, and the exhalations from fissures or crevices, in slate and stone quarries, all which are generally known under the denomination of Sulphur Damps ; I say, all these kind of vapours are never without this delicate white alkaline earth ; wherefore I recommend to all Mineral-water Essayers, a careful investigation into the nature and quality of this earth. There is, however, in some Mineral-waters, particularly in the *Thermæ, Materia Selenitica* ; but as this is in but few Mineral-waters, it ought to be very carefully distinguished, so that one may not be mistaken for the other.

12. THERE are several Mineral-waters, that contain more than one species of salt at one and the same time ; Mr. Bolduc le fils, in

in the year 1726, when he analyzed the Waters of Passy in France, discovered a method, by which the several species of salts, when found in the Mineral-waters, may be separated from each other; the operation is performed with rectified spirits of wine; this discovery is deservedly placed amongst the general experiments, and as such recommended to all succeeding Mineral-water Essayers.

13. WITH respect to the Thermæ, and all other hot or warm waters, the Analyzers ought to be very exact in the determination of the true and certain degree of the heat or warmth; which should be compared with the contents, obtained by evaporation or otherwise, and properly separated, so that every species may be examined in its natural state. By which means the composition will not only be exactly known, but will, at the same time, enable the Analyzer to ascertain their virtues and properties, with great precision.

14. THE natural sediment of Mineral-waters, which they deposit in their current,

or

or by incrustation, on the stones of the Reservoir, ought to be extremely well examined ; because it is very remarkable, that the volatile elastic spirits entangle, and unite themselves with this natural precipitation, in such a manner, that the Analyzer, after Dr. Seip's method, very easily may come at them. I recommend this as a general Experiment, and therefore must not be neglected.

15. OIL of Vitriol causes a heat in common, and also in Mineral-waters ; but I have met with several Mineral-waters, of no disagreeable taste, whose course was thro' beds of Arsenical Mondycs, with which the oil of vitriol would cause no manner of warmth, and on farther Examination, found these kind of Waters very pernicious to Animals ; for which reason, I apprehend it deserves a place amongst the capital experiments, viz. that where the oil of vitriol causes heat, the waters are salutary ; and if otherwise, pernicious. I cannot omit mentioning here a circumstance, which is, that the waters I met with in *Turbaries*, are in general warm, I had once the good Luck to get, at 40

feet deep, in a Turbary, a natural warm water; which was as hot as blood, which, with oil of vitriol, made an extraordinary ebullition, and made the water much sooner cold, than what, of an equal quantity in a glass exposed to the open air, did. But I found no contents in this water detrimental to the animal Constitution, altho' the oil of vitriol was a cooler, instead of an increaser of heat. But, for this we can safely account, when we examine this burning earth, called Turf, whose agent is a *Petroleum*, too nearly related to the oil of vitriol, to suffer an intestine motion, to change into, or produce another compound.

16. THE white metallic earth must be tried with metals, or by itself, in a smelting fire, and if the same mixes therein with silver or copper, or without metals, or salts vitrify, we then may pronounce the same to be an undetermined Metallic-earth, and one of the primary physical causes of all metals and minerals.

17. I WILL not add any more to the general or capital experiments; because, I am
sure,

sure, that these I have here related, are sufficient to discover, and obtain the ingredients, in all sorts of Mineral-waters; in-
somuch, that there is no need for the particular experiments I have promised, and therefore might very well be dispensed with; but yet, as we are not destitute of very good ones, that belong to this class, I will not pass them over in silence.

18. POWDER, tincture or infusion of Galls, is a certain experiment to discover *Iron-earth* in Mineral-waters.

19. SYRUP of Violets, by changing Mineral-waters into a red colour, is a certain experiment, to discover a predominant acid in these Waters, but is never to be depended upon for detection of alkalies; because, this syrup will change green with Mineral-waters by the iron-earth, and from other mineral contents, as well as from alkalies.

20. A SOLUTION of silver is a sure criterion for the discovery of common salt in waters. Some Mineral-water Essayers, by the help of solution of silver, attempt to de-

termine if there is brimstone in the Mineral-waters; because, they say, if it contains this mineral, a solution of silver will strike, or cause an agate or amethyst-like colour, when mixed with these Waters; but this experiment is not to be depended upon, because I have analyzed several waters, that were not destitute of Brimstone; but I never found, that a solution of silver caused any such like colour.

21. OIL of Tartar per Deliquium discovers, in Mineral-waters, that white metallic earth we have been speaking of, §. 16. but as the solution of tartar detects in the same manner the *Materia Selenitica*, and all other earth, the sediment thus obtained, must undergo the smelting fire, before it can be determined to what genus it belongs; the whole alkaline tribe has the same effect upon Mineral-waters, as liquid tartar.

22. THE mixtures of acid with Mineral-waters (oil of vitriol only excepted) seems to me of no manner of signification, and therefore ought in my opinion to be totally exploded.

23. To

23. To immerse for a time, or boil fresh eggs in Mineral-waters, is a sure method to obtain any unctious earth in Chalybeate waters, in their natural state, which cannot be got by any other means.

24. SOLUTIONS of mercury, salt of lead, white vitriol, alum, salt ammoniac, &c. are beneficial in precipitating opposite contents in Mineral-water; for this only they are useful, and where they cause no precipitation, not any conclusion can be drawn from them.

25. If colours, or dyes, such as cochinele, sumach, fernambuca, rhubarb, and other drugs, are used in the analization of Mineral-waters, they must be, in simple tinctures or decoctions, made with the best spirits of wine, and distilled rain-water, without any other mixtures whatever; the effects these colours produce are so well known, that it is needless to repeat them here.

THUS I conclude the Experiments, which, if they are judiciously used, it will be

be found, that they are *the best method, for analyzing Mineral-waters*; and therefore will proceed to the second, and last part of the question, viz. *If analyzing alone is sufficient to enable us to determine exactly their virtues and properties.*

1. IT is most evident by the first part of the question, that this learned Academy takes it for granted, that the contents of Medical Mineral-waters cannot be known without analization, and therefore they ask for the best method for this purpose; to this I may safely add, that the virtues and properties of these Waters cannot be known, but from the contents that are dissolved in them, and the contents are by no other means obtainable than by analization.

2. THE intent of analyzing Mineral-waters has, in all ages, been to know their contents; and to become acquainted with their virtues and properties; and no other method could be suggested for both these purposes, but experiments; because it was out of the power of imagination, abstract or occult reasoning, or any thing else, to come at the know-

knowledge of any one content in Mineral-waters, without manual operation. The brute animals never meddle with, or drink salutary Mineral-waters; so that nothing can be learned from them. I say, the brute creation will not meddle with Medicinal-waters; but I must not forget to mention, that they will drink poisonous Mineral-waters, to their destruction; I mean such waters, where lead and copper ore has been washed, such as comes thro' arsenical monodyc beds, &c. or is impregnated with smoak, that comes from a furnace, where lead ore is smelted.

3. THE most learned Members of the Medical Faculty, and the most illustrious natural Philosophers, in all ages, agree, that Mineral-waters require a most judicious and careful analization; so that the small part of any content, or ingredient, may not escape; because the virtues and properties cannot, by any other means, be ascertained or determined. And here I beg leave to repeat the opinion of the most learned Dr. Hoffman, on this very subject, in his Experiments and Observations on
Mi-

Mineral-water*, viz. “ the reason why this
 “ useful and necessary acquaintance with
 “ the virtues and efficacy of remedies is so
 “ much slighted, seems, principally, because
 “ the antients, and many of the moderns,
 “ were totally ignorant of the elements of
 “ chemical Philosophy ; so that they could
 “ not properly examine the texture and
 “ composition of the simples ; nor arrive at
 “ the art of discovering the principles where-
 “ of they consist : whence they never ob-
 “ tained a previous knowledge of their vir-
 “ tues, before they prescribed the things.”

4. I HAVE already observed, that the poi-
 sonous Mineral-waters are in a manner
 tasteless ; or at least cannot be discovered by
 the taste ; nor is it in the power of the
 most able anatomist, to discover the cause,
 by dissecting a body of an animal, that is
 destroyed by them ; because their poisonous
 particles are so exceeding small, that it is
 impossible to demonstrate them perceptibly,
 or show any effects of them, when they

* Dr. Hoffman's new Experiments and Observations
 upon Mineral waters, translated by Dr. Shaw, page. 2.
 §. 5.

are mixed with the animal fluids. Since then the cause cannot be discovered from the effects, analization must set us right, as the only means for the discovery of good and bad qualities. And to this I beg leave to add, that from analization only, these, in other respect poisonous waters, have been found most excellent external remedies, in many obstinate disorders.

MINERAL Waters have never been ventured upon without a previous analization. Experimental enquiries into the nature of these Medical-waters, have prevailed in all ages; and by these means only, the most learned Dr. *Hoffman* ascertained the virtues and properties of the *Sedlitz* Waters; and for the instruction of others, who may happen to be less versed in the examination of unexperienced Springs, he communicates his analyzing process *.

6. ALL Mineral-waters differ from each other in quantity of mineral Contents, so that

* Dr. *Hoffman*'s new Experiments and Observations upon Mineral Waters, translated by Dr. *Shaw*, pag. 83. §. 86.

that it is scarce possible to meet with two waters, that belong to one and the same class, that are in all respects exactly like one another. This difference, which universally prevails amongst the Medical Mineral-waters, can by no other means be ascertained, but by analization. From what I have advanced here, I am of opinion, that by analyzing only, the Virtues and Properties of Mineral Waters must be discovered. I conclude this Essay, and submit it to the determination of the Learned Academy.

F I N I S.



P. S. Being at a great distance from the Press, it is impossible that this Performance can appear without typographical errors, some are pointed out here, and I beg the good natured Readers to excuse those that have escaped.

E R R A T A.

Page 4, Line 23, for sets read *set*. — P. 13, l. 9, for with r. *of*. — P. 19, l. 24, for about r. *at*. — P. 22, l. 8, for Llan r. *Llangybi*. — P. 26, l. 13, for Vidence r. *Evidence*. — P. 33, l. 3, for it r. *them*. — P. 44, l. 11, for Franvifstreet r. *Francis-street*. — P. 47, l. 20, for is r. *are*. — P. 51, l. 16, for disferable r. *dismal*. — P. 56, l. 19, after disappearing add, *but no signs of the Menses*. — P. 57, l. 13, for days r. *hours in each fit*. — P. 66, l. 7, for Empenacumatici r. *Empyreumatici*. — P. 68, l. 1, for notion r. *Estimation*; and l. 14, for notion r. *Judgment*. — P. 75, l. 8, dele *that*.

P. 2. Being at a great distance from the Press,
it is impossible that this Performance can appear
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E. R. A. T. A.

Page 4. Line 23. for read for. — P. 12. l. 9. for with
r. 27. — P. 107. l. 24. for about r. at. — P. 201. l. 8. for than
r. change. — P. 206. l. 12. for bridge r. bowman. — P. 217.
l. 3. for it a them. — P. 244. l. 11. for Penetration r. Power.
— P. 245. l. 20. for is r. are. — P. 251. l. 18. for di-
tecture r. change. — P. 251. l. 19. after all preceding add, for
as after the change. — P. 271. l. 23. for are r. have in read
r. — P. 280. l. 17. for incommensurable r. incommensurable. —
P. 282. l. 1. for notion r. estimation and l. 14. for notion
r. argument. — P. 282. l. 8. delete them.



